UNIVERSITI PUTRA MALAYSIA

THE USE OF INFORMATION TECHNOLOGY IN MANAGING THE SUPPLY CHAIN OF MALAYSIAN PALM OIL INDUSTRY: THE CASE OF FELDA

NITTY HIRAWATY KAMARULZAMAN

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By

NITTY HIRAWATY KAMARULZAMAN

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in the Graduate School of Management Universiti Putra Malaysia

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in partial fulfillment of the requirements for the degree of Master of Science.

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Chairman: **Professor Mad Nasir Shamsudin, Ph.D.**

Faculty: **Graduate School of Management**

This study was carried out to investigate the use of information technology (IT) and information systems (IS) by Malaysian palm oil industry in managing their supply chain. This study focused on Felda's palm oil supply chain which comprised of its subsidiary companies namely Felda Plantations Sdn. Bhd., Felda Palm Industries Sdn. Bhd., Felda Vegetable Oil Products Sdn. Bhd., Felda Transport Services Sdn. Bhd. and Felda Marketing Services Sdn. Bhd.. Investigation was also made to examine the extent of these palm oil companies in managing their primary and support activities and how IT and IS support those activities to improve the company's supply chain. In addition, the study was also done to investigate the utilization of IT and IS in all levels and activities of the company's supply chain.

Data for the study were obtained through close-ended questionnaires that were mailed to the respondents comprised of managers from Felda's companies that were involved along supply chain. Data collected from the survey were analyzed using descriptive analysis, regression analysis, correlation analysis and reliability analysis.

Result showed that Felda has effectively managed its primary activities particularly in estates, palm oil mills and refineries. Felda also has managed its inbound and outbound logistics as well as its marketing activities effectively. However, the results revealed that IT has not been fully used to effectively support certain primary and support activities, particularly in estates operations. However, while IT has made a lot of contribution to support palm oil mills support activities, it has made less contribution to support their primary activities. Further, IT has contributed significantly to support refineries' primary and support activities. At the same time, the results revealed that IT has effectively support distribution and marketing activities.

From the findings, several recommendations are given to assist Felda and other palm oil based companies to enhance the management of their activities along their supply chain and help them to be more competitive in the industry.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Master Sains.

PENGGUNAAN TEKNOLOGI MAKLUMAT DALAM MENGURUSKAN RANTAIAN BEKALAN BAGI INDUSTRI KELAPA SAWIT MALAYSIA: BAGI KES FELDA

Oleh

NITTY HIRAWATY KAMARULZAMAN

November 2002

Pengerusi: **Profesor Mad Nasir Shamsudin, Ph.D.**

Fakulti: **Sekolah Pengajian Siswazah Pengurusan**

Kajian ini dijalankan bertujuan untuk menyelidik penggunaan teknologi maklumat (IT) dan sistem maklumat (IS) oleh industri kelapa sawit Malaysia dalam menguruskan rantaian bekalan mereka. Kajian ini difokuskan kepada rantaian bekalan kelapa sawit Felda yang terdiri daripada anak syarikatnya iaitu Felda Plantations Sdn. Bhd., Felda Palm Industries Sdn. Bhd., Felda Vegetable Oil Products Sdn. Bhd., Felda Transport Services Sdn. Bhd. dan Felda Marketing Services Sdn. Bhd.. Penyelidikan juga dijalankan untuk memeriksa sejauh mana syarikat kelapa sawit ini menguruskan aktiviti utama dan sokongan mereka dan bagaimana IT dan IS menyokong aktiviti tersebut untuk memperbaiki rantaian bekalan syarikat. Tambahan lagi, kajian ini turut dijalankan untuk menyelidik penggunaan IT dan IS di semua peringkat dan aktiviti rantaian bekalan syarikat.

Data untuk kajian diperolehi melalui soal-selidik tertutup yang dihantarkan melalui pos kepada responden yang terdiri daripada pengurus-pengurus syarikat Felda yang terlibat di sepanjang rantaian bekalan. Data yang dikumpulkan daripada kajian

dianalisis menggunakan analisis diskriptif, analisisi regrasi, analysis korelasi dan analisis kebolehpercayaan.

Hasil kajian menunjukkan bahawa Felda telah menguruskan aktiviti utama mereka dengan efektif terutamanya di ladang kelapa sawit, kilang kelapa sawit dan kilang penyaring kelapa sawit. Felda juga telah menguruskan logistik masuk dan keluar serta aktiviti pemasaran dengan berkesan. Walaubagaimanapun, hasil kajian mendedahkan bahawa IT tidak digunakan sepenuhnya untuk menyokong aktiviti utama dan sokongan secara berkesan terutamanya bagi operasi ladang. Namun begitu, IT telah membuat banyak sumbangan untuk menyokong aktiviti sokongan kilang kelapa sawit, serta sedikit sumbangan untuk menyokong aktiviti utama. Seterusnya, IT turut menyumbang secara bererti untuk menyokong aktiviti utama dan sokongan kilang penyaring kelapa sawit. Pada masa yang sama, hasil kajian mendedahkan bahawa IT telah menyokong secara efektif aktiviti pengagihan dan pemasaran.

Daripada penemuan ini, beberapa cadangan telah diberikan untuk membantu Felda dan lain-lain syarikat yang berteraskan kelapa sawit untuk meningkatkan pengurusan aktiviti mereka di sepanjang rantaian bekalan serta membantu mereka untuk lebih berdaya saing di dalam industri kelapa sawit.

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Last but not least, I would like to express my heartfelt thanks to the most important man in my life, my dear husband, Yahya Bazlan Ismail, who shares my burden and continuously gives full support, encouragement and love during my study. To my beloved sons, Muhamad Naqib and Muhamad Hakimi, mother, father, sister and brother thanks for always cheering up my life and giving me happiness.

I certify that an Examination Committee met on 30th November 2002 to conduct the final examination of Nitty Hirawaty Kamarulzaman on her Master of Science thesis entitled "The Use of Information Technology in Managing The Supply Chain of Malaysian Palm Oil Industry: The Case of Felda" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommended that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

Syed Abd. Kadir Syed Long Alsagoff, Ph.D.
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

Mad Nasir Shamsudin, Ph.D.
Professor
Graduate School of Management
Universiti Putra Malaysia
(Member)

Jamil Bojei, Ph.D.
Lecturer
Graduate School of Management
Universiti Putra Malaysia
(Member)

Mohd Zain Mohamed. Ph.D.
Lecturer
College of Business and Economics
UAE University
United Arab Emirates
(Member)

ARFAH SALLEH, Ph.D.
Associate Professor/Deputy Dean
Graduate School of Management
Universiti Putra Malaysia

Date: 27/1/03

This thesis submitted to the Senate of Universiti Putra Malaysia has been accepted as partial fulfillment of the requirements for the degree of Master of Science.

ZAINAL ABIDIN KIDAM
Associate Professor/Dean
Graduate School of Management
Universiti Putra Malaysia

Date: 28/1/03

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

NITTY HIRAWATY KAMARULZAMAN

Date: 16 January 2003

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LIST OF ABBREVIATIONS

ADC	Automated Data Collection/Captured
APS	Advanced Planning and Scheduling
CAD	Computer-Aided Design
CAM	Computer-Aided Manufacturing
CAPP	Computer-Aided Process Planning
CIM	Computer-Integrated Manufacturing
CPFR	Collaborative Planning, Forecasting and Replenishment
CPO	Crude Palm Oil
DRP	Distribution Resource Planning
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
FFB	Fresh Fruit Bunch
GDP	Gross Domestic Product
IS	Information Systems
IT	Information Technology
JIT	Just In Time
MES	Manufacturing Execution Systems
MH	Automated Materials Handling Systems
MIS	Marketing Information Systems
MPR	Manufacturing Production Report
OMS	Order Management Systems
POS	Point-of-Sales
PPO	Processed Palm Oil
R & D	Research and Development

RML	Rangkaian Maklumat Ladang
SCM	Supply Chain Management
TMS	Transportation Management Systems
VMI	Vendor Managed Inventory
WMS	Warehouse Management Systems
WWW	World Wide Web

CHAPTER I

INTRODUCTION

This chapter presents the background of the Malaysian palm oil industry, the discussion on the supply chain management concepts and the supply chain in the Malaysian palm oil industry. This chapter also presents the problem statement, objectives of the study, significance of the study and organization of the thesis.

1.1 Malaysian Palm Oil Industry

The Malaysian palm oil industry has witnessed tremendous growth during the last four decades as reflected in the continuous expansion in the planted area of oil palm, and the production and exports of palm oil (Table 1.1).

Table 1.1: Planted Area of Oil Palm, Production of CPO, Export and Export Value of Palm Oil

Year	Planted Area of Oil Palm (hectares)	Production of CPO (tonnes)	Export of Palm Oil (tonnes)	Export Value of Palm Oil (RM million)
1960	54,638	91,793	97,568	61.23
1970	261,199	431,069	404,198	273.6
1980	1,023,306	2,573,173	2,749,752	3,212.3
1990	2,029,464	6,094,622	6,105,300	5,983.8
1995	2,540,087	7,810,546	8,459,700	12,378.2
1996	2,692,286	8,385,886	9,322,900	11,678.1
1997	2,819,316	9,068,728	9,607,866	12,894.3
1998	3,078,116	8,319,682	9,901,039	21,348.6
1999	3,313,393	10,553,913	11,847,487	19,210.5
2000	3,376,664	10,842,095	12,365,849	14,928.6

Source: Malaysian Oil Palm Statistics, 2001

1.1.1 Planted Area

Oil palm cultivation in Malaysia has expanded rapidly as a result of the conversion of target tracts of private rubber holdings to oil palm estates as well as large-scale cultivation by federal and state governments in new land areas. This happened when the government undertook the agricultural diversification program in the 1960s, to reduce the country's economic dependence on rubber and tin. In 1960, the total planted area under oil palm cultivation was 54,638 hectares. Two decades later, in 1980s, the total area planted under oil palm reached 1,023,306 hectares (PORLA, 1980). Since then, the total planted area increased marginally and in 2000, the total planted area reached 3,376,664 hectares (Table 1.1).

1.1.2 Production

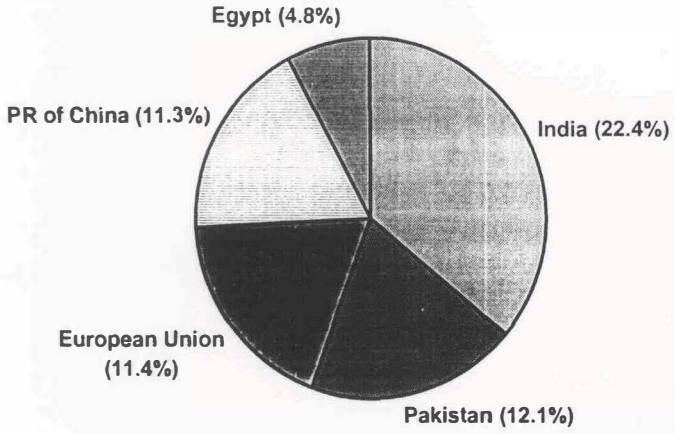
Production of crude palm oil (CPO) has increased dramatically over 40 years. In 1960, Malaysia produced only about 91,793 tonnes of CPO, but by the year 1970s, production increased to 431,069 tonnes. Output continued to increase rapidly to 2.57 million tonnes in 1980 and 6.09 million tonnes in 1990 (Table 1.1). Based on the Table 1.1, production of palm oil increased significantly from 1990 up to 1999. However, production dropped from 9.07 million tonnes in 1997 to 8.32 million tonnes in 1998. The decrease in production was most probably due to the impact from the worldwide economic and Asian currency crises in 1997, resulting in deflated demand for industrial products. Nevertheless, production started to increase again in 1999 at 10.55 million tonnes from 1998. In 2000, the production of CPO reached 10.84 million tonnes.

1.1.3 Exports

Total export of palm oil products recorded increases over the last 40 years. Palm oil exports have increased tremendously since the 1960s. Exports of palm oil products in 1960 were 97,568 tonnes but the expanding output, which was increasingly channeled to overseas markets, saw total exports rising to 6.11 million tonnes in 1990 (Table 1.1). In 2000, total exports of palm oil increased two-fold to 12.37 million tonnes. Total export value of palm oil has also increased dramatically since the 1960s. In 1995, the export value was RM12.38 billion, but the value fluctuated from 1996 to 2000 due to unstable prices of palm oil and the Asian currency. The highest export value accounting to RM21.35 billion was recorded in 1998 and it was then the largest foreign exchange earner of the country (MPOB, 2000).

By the year 2000, India remained the largest export market for Malaysian palm oil at 2.03 millions tonnes (22.4% of total exports) (Figure 1.1). Pakistan was the second largest export market at 1.10 million tonnes (12.1%). The European Union, the People's Republic of China and Egypt followed next with exports totaling 1.04 million tonnes (11.4%), 1.02 million tonnes (11.3%) and 0.43 million tonnes (4.8%), respectively.

Figure 1.1: Export Volume by Countries



1.1.4 Competitiveness of the Malaysian Palm Oil Industry

The top five crude palm oil (CPO) producers, namely Malaysia, Indonesia, Nigeria, Colombia and Thailand contributed 12.54 million tonnes or 82.4% of the world production in 1995 (Table 1.2). In 2000, these producers contributed about 21.73 million tonnes or 90% of the world production and Malaysia remained the leader by producing 10.84 million tonnes of palm oil or about 50% of the world production. Malaysia maintained the position as the world's largest palm oil producer and was quite far ahead compared to other competitors such as Indonesia and Nigeria (MPOB, 2000). Since Malaysia is the biggest palm oil producer in the world, Malaysia is considered to be the major market player in the world palm oil trade and is able to influence the supply and prices of CPO in the international market.

The Malaysian palm oil industry also contributes much to the world oils and fats economy. Malaysia contributed 9.5% of the world oils and fats production. Malaysia is also the world's leading palm oil exporter contributing to 60.7% of the

total world trade in palm oil. World palm oil exports constituted 42.0% of the total oils and fats trade, out of which 72.0% is made up of Malaysian palm oil. Thus, palm oil has relatively made a major impact on the world oils and fats market, providing strong competition to soybean oil and other animal fats (Economic Report, 2000/2001).

Table 1.2: World Major Producers of Palm Oil: 1995-2000 ('000 tonnes)

Country	1995	1996	1997	1998	1999	2000
Malaysia	7,221	8,386	9,069	8,319	10,554	10,842
Indonesia	4,008	4,540	5,380	5,100	6,250	7,000
Nigeria	640	670	680	690	720	740
Colombia	353	410	441	424	501	524
Thailand	316	375	390	405	495	525
Rest of World	2,672	1,901	1,943	1,981	2,111	2,194
World	15,210	16,282	17,903	16,919	20,631	21,825

Source: i) Oil World, Statistics Update, Various Issues
ii) Malaysian Palm Oil Board, 2000

1.1.5 Contribution of Palm Oil Industry to the Malaysian Economy

The latest economic indicators on Malaysia's economic performance show that recovery measures taken by the Malaysian government have yielded positive results. Real Gross Domestic Product (GDP) recovered to 5.4% in 1999 from –7.5% in 1998. First quarter growth for year 2000 was –11.7%. Broad based growth rate for certain sectors in 2000 such as manufacturing was 27.3%, services were 6.3%, agriculture was 2.9% and construction was 1.2% (MITI, 2000). The positive attributes of GDP from the agriculture sector which was mainly contributed by the palm oil industry has been recognized as the major contribution to the Malaysian GDP.

In 1998, after the economic crisis, the palm oil industry contributed substantially to the Malaysian economy, accounting for 9.2% of the country's GDP. This suggests that palm oil industry will have to play a major role in sustaining maximum contribution of the agriculture sector as well as Malaysia's economic performance in the future. Palm oil industry contributes towards a very versatile industry, as it can be easily included in many manufacturing activities and also able to contribute directly to the expansion of the manufacturing sector. The palm oil industry indeed has a great impact in meeting the challenges of the economic development of Malaysia. In the year 2000, export earnings from palm oil and its related products reached RM14.9 billion, thus maintaining its position as the second largest export earner for the country after electrical and electronic products.

1.1.6 Strengths and Challenges

The success of the Malaysian palm oil industry is the result of the ideal climatic conditions, efficient milling and refining technologies and facilities, research and development (R&D), efficient and effective use of management tools and marketing strategies. In addition, the Malaysian government is fully committed to the expansion of the industry and encourages global expansion of palm oil production. Being a highly competitive and profitable industry, oil palm will continue to expand its planted area as well as marketing approach in the future. This will help the agriculture sector to maintain a reasonable growth rate, projected at 3% per year. To maintain the stability and competitiveness in the market place, palm oil industry must be willing to face the future challenges. As pointed out by Yusof and Ahmad (1994), major challenges faced by palm oil industry include increasing value added,